 0030-0950/80/0005-0195 $2.00/0

# HIGHLIGHTS OF A CAREER IN MEDICAL SCIENCE[1, 2]

LIBERATO JOHN A. DIDIO, Dean of Graduate School, Medical College of Ohio at Toledo, Caller Service 10008, Toledo, OH 43699

OHIO J. SCI. 80(5): 195, 1980

In thinking about this presentation, I decided to share with you the highlights of my career as a scientist, which on this ceremonious occasion may be considered the confessions of an Academy President, and to dedicate the presentation especially to the young scientists of Ohio. I should alert you, however, that as a physician who is concerned with preventive medicine, I will not deliver a purely serious speech. Science is serious, but not necessarily sad—as you shall see, I have thoroughly enjoyed my life as a scientist.

Trained as a surgeon, early in my career I made the decision to become an anatomist and to devote my life to disassembling, studying, and analyzing one of Nature's masterpieces. My lifelong learning has led me to an appreciation, highlighted by a continuing sense of wonder, of the miracle of life and the human body. From the practical standpoint, my decision to be an anatomist was to serve mankind through my work as a scientist and educator. I later came to realize that I recreated in my own life the same situation that existed at the creation of the world. When it was asserted that God must have been a surgeon, as only through surgery could He first perform the costectomy in Adam to create Eve, an anatomist protested, saying that God first had to know anatomy in order to find the proper rib. At that point, an educator intervened, exclaiming: Everyone knows that in the beginning there was chaos and who knows better than educators how to create chaos? So, while creating chaos, I have had an opportunity to do some research, to teach, and ultimately to help my fellow humans during our sojourn on this lovely planet.

I became a scientist because I felt that I could reach many more human beings if, instead of treating patients individually, I could, as a result of my investigations, make a discovery that would benefit untold numbers of people. I recognized that in this respect I was on very thin, idealistic, ground; but an innate optimism sustained my hope that I could succeed. Early in life, I believed that instead of looking at things and asking why, one should aim for impossible dreams, asking why not? As psychiatrists have attempted to explain such illusions of grandeur, they state that it is normal to be an arsonist at age 18 and a fireman at 25. With the naiveté and

[1]Manuscript received 28 June 1980 and in revised form 8 July 1980 (#80-36).

[2]PRESIDENTIAL ADDRESS—Presented at the 89th Annual Meeting of the Ohio Academy of Science held at The University of Toledo, Toledo, OH on 20 April 1980. Dr. Liberato J. A. DiDio, Dean of the Graduate School and Chairman and Professor of Anatomy at the Medical College of Ohio, served as President of The Ohio Academy of Science 1979–1980. He received his B.S., M.S., M.D. and Ph.D. degrees, all *summa cum laude*, from the University of São Paulo, Brazil. After 21 years in academic medicine at Brazilian universities, he became a research Fellow at New York City's Rockefeller University and later moved to Northwestern University as Professor of Anatomy. He was appointed Chairman of the Department of Anatomy at the Medical College of Ohio in 1966 and Dean of the Graduate School in 1972. The University of Toledo chapter of Phi Kappa Phi cited him as a distinguished member and the International Institute of Greater Toledo presented him with the Golden Key Award. Proficient in 5 languages, Dr. DiDio has published well over one hundred scientific papers. His many international honors include Honorary President of the Pan American Association of Anatomy, the Order of Merit in Medicine of the Republic of Brazil, the Andreas Vesalius Award from the Mexican Society of Anatomists, the Medal for Cultural Merit of the Republic of Italy, and the Rorer Award from the American Society of Gastroenterology.

determination characteristic of youth, I promised myself that I would be the top student in my class, and would devote myself to mastering everything that my instructors taught. Knowing how capricious grading systems and individual teacher's judgments can be, not to mention personal preferences and biases, it can readily be seen that much juvenile boldness was involved in the goals I had set for myself.

Another goal was to acquire broad knowledge of the medical sciences and, at the same time, to perform investigations into different areas and levels of structure of the human body utilizing a variety of techniques, striving to be both eclectic in medical biology and profound in each field at the vanguard of science. If successful, I would be able to grasp the means of attack for each scientific problem from different angles without losing the general view of the main field and possibly of adjacent fields as well. Ultimately, my aim was to acquire a deep insight into each problem while maintaining a broad view of the subject. While some of my colleagues were devoting their efforts to becoming experts in the subspecialties of anatomy, as a young Don Quixote, I tried to master all of them —an almost impossible dream.

The next problem was to select a mentor who could serve as a paradigm in my idealistic quest. I selected Professor Renato Locchi (1896–1978), who ultimately became my spiritual father. Under this inspiring teacher, physician, pharmacist, anatomist, and philosopher, I began to study the incidence of Whitnall's orbital tubercle (DiDio 1942) in the human zygomatic bone (fig. 1), which was rarely mentioned in anatomy textbooks. I wondered then whether the absence of description was due to the lack of confirmation in finding the prominence or due to the negligence of anatomists toward the relatively recent discovery by Whitnall in 1911. While searching the literature on the subject, I studied 285 skulls and found, among many other data, that the prominence

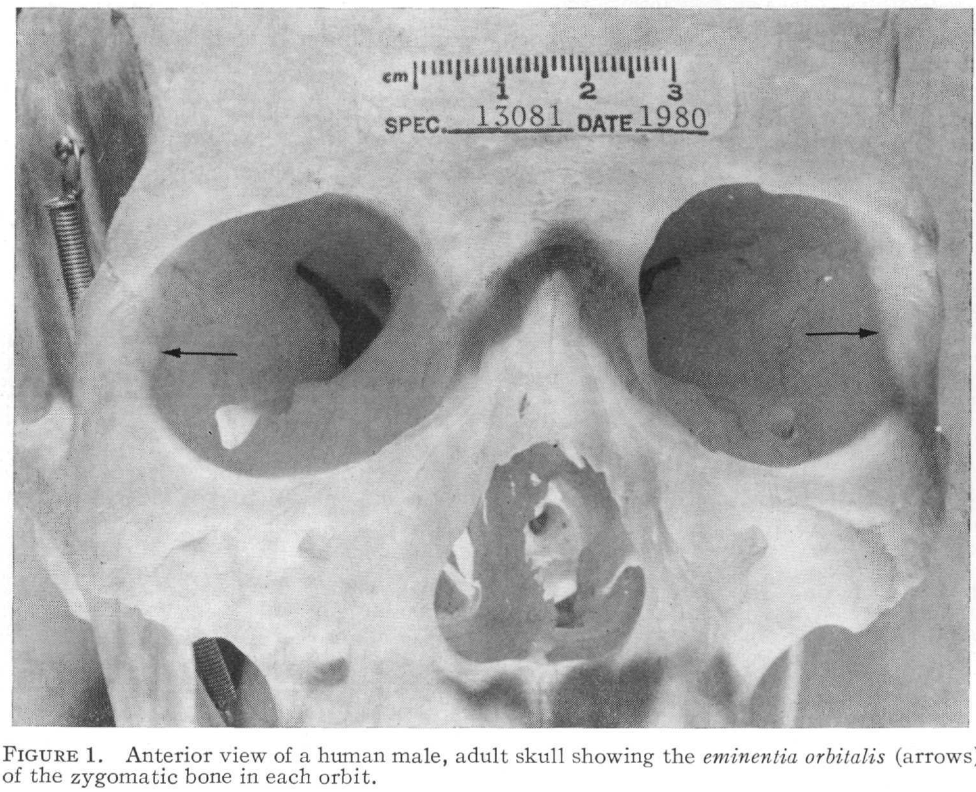


FIGURE 1. Anterior view of a human male, adult skull showing the *eminentia orbitalis* (arrows) of the zygomatic bone in each orbit.

occurred in 89% of the cases—91% in males and 82% in females. Surrounded by numerous skeletons in an enormous osteology museum, where the deep silence was broken only by my pen as it committed my observations to paper, I cannot describe the awe of that moment. Suffice it to say that what started as a seemingly macabre investigation, working in solitude among a multitude of human skulls, became an exciting experience. Those lifeless skulls were transformed through intense and devoted study from objective research material to sensible, although inert, individuals. They became my new, quiet, docile friends, and I became their admirer. By the time the investigation was completed, I had developed from a naive, idealistic student into an embryonic scientist who had found life in death, for through those dead skulls I had found my life as a scientist. The same friendship later developed with 100 patients who volunteered to participate in a study to observe and detect the orbital eminence *in vivo.* I came to know each of them by name and I am still grateful to each and every one.

In the realm of science, the study noted above confirmed that the bony projection was found in almost all cases and demonstrated it with x-rays for the first time in living individuals. The morphology studies justified a change in its name to *eminentia orbitalis.* My paper received recognition when Terry and Trotter (1953) quoted it in their chapter on osteology in Morris' **Human Anatomy.**

Twenty years later I repeated this study in a unique series of skulls from India in the Department of Anatomy at the University of Washington School of Medicine. The results confirmed that the orbital eminence is present in 96% of the cases (DiDio 1962).

I was reminded of the contribution of another young student, Ruggero Oddi, who in 1887 discovered the sphincter at the termination of the bile duct in the duodenum. Although my statistical study cannot be compared to Oddi's discovery while he was a student, I do wish to emphasize that young investigators should be proud to know that the name of a student was given to an anatomical structure—Oddi's sphincter—and even to one of its diseases—Odditis. It has become one of the most widespread eponyms in the world's medical literature. As an investigator studying the orbit, I felt that I had already become a doctor of philosophy in the *eminentia orbitalis*—a minuscule prominence on the skull, but a gigantic structure for a neophyte medical student and incipient young anatomist. Life would later teach that dimensions shrink in relation to the scientist's age—another aspect of one's relativity.

In retrospect, the *eminentia orbitalis* project was the first highlight of a scientific career and a honeymoon with science that is still going on. In fact, while perusing an issue of the **Folia Anatomica Japonica,** in which I was searching for an article on the orbital eminence, I happened to open to page 105—a lucky accident—where I found a most unusual paper by Okamoto (1922) describing a narrowing of the left common iliac vein. I will refer to this research project later, as it eventually became my thesis topic for the doctor of science degree.

Having decided to begin work in the chemistry laboratory of the physiology department, I had to give up promising careers in baseball, basketball, fencing, and soccer, forgetting about "*mens sana in corpore sano* . . ." This new activity would familiarize me with and, if possible, lead me to master the basic techniques commonly utilized in experimental research at the molecular level of biological structure. Following the directions of my advisors in physiology, I studied the importance of traces of manganese in nutrition and in human biology from the biochemical and functional standpoints (DiDio 1943 and 1944). The project originated from Orent and McCollum's (1931) interesting observation that a manganese-free diet prevented rats from nursing their young in 58 out of 59 pregnant animals. Knowing that an increasing number of women were not able to secrete sufficient milk to breastfeed their infants, I raised the question of whether the absence in foods of manganese, one of the oligodynamic elements that acts as a catalyst, might be responsible for the deficiency. An interesting study performed in the city of São Paulo indicated that while most of the wealthy women could not provide milk to nurse their infants, most poor women had abundant milk to feed usually numerous infants as well as to nurse the infants of others. Perhaps the poorer people, eating the less expensive, unpolished grains, ate some of the seed coat (or cuticle) through which needed minute amounts of manganese were obtained. To make a long story short, it was determined that manganese is found in the lupine seed and is more concentrated in the cuticle of rice, soybeans, black beans, corn, mango, and lupine seeds than in the pulp. With modern food processing and elaborate cooking, it was likely that these traces of manganese—so essential for nutrition—were lost. The paper was published and was widely quoted, but it marked the end of my scientific activities in the field of physiology.

As World War II raged, I was trained to become an infantry officer while going through medical school. Lack of time and my curiosity about the unusual narrowing of the left common iliac vein made me give up the continuation of the work on manganese and to concentrate on research in anatomy. The first author to describe adhesions that reduced the lumen of the common iliac veins was McMurrich (1906, 1907, 1908), who discovered adhesions in the venous walls while searching for valves in the veins. He attributed the adhesions to the pressure exerted by the right common iliac artery and to defective embryological development. Having observed a much higher incidence of adhesions in the left than in the right iliac vein, McMurrich correlated the finding with the most frequent cases of thrombosis in the left inferior member. Several authors investigated this question, but, with few exceptions, the literature on the subject was enlarged but not enriched.

The confusion that then existed challenged further study on the problem. It turned out that the adhesions had a relatively high incidence (approximately 40%), predominantly in the left common iliac vein, and were not congenital but acquired formations caused by the arterial compression and pounding of the vein (DiDio 1949) against the vertebral column (figs. 2, 3). The adhesions were

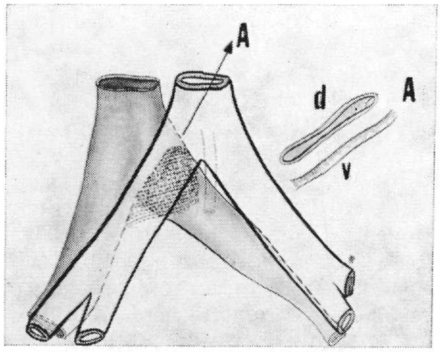


FIGURE 2. Diagram of the *common iliac veins* and the beginning of the *inferior vena cava* and their anterior relationship with the aorta and the common iliac arteries (female, adult, Caucasian). The cross-hatches indicate an *adhesion* between the anterior and posterior walls of the terminal segment of the left common iliac vein, corresponding to the area related to the right common iliac artery. Inset A shows a cross section of the posterior wall of the right common iliac artery in front (v) of the obliterated left common iliac vein (d) at the level of the arrow A (from DiDio 1949).

unrelated to developmental inhibition, and their location in the left vein projected posteriorly on the most prominent portion of the anterior aspect of the disc between the 4th and 5th lumbar vertebrae. This coincidence suggested that the upright posture of man was, at least in part, responsible for the occurrence of adhesions as well as for the appearance of varicose veins, a disease found only in humans. The posterior aspect of the terminal segment of the left common iliac vein was actually pinched by an arterial forceps, formed by the right common iliac artery (anterior to the vein) and the middle sacral artery (posterior to the vein), at the level of the above mentioned intervertebral disc. This finding—a vein squeezed between arteries—caused a chain reaction, as is common in scientific research, leading me to extend the study to the renal vein (DiDio 1956), which is also under the same stress. One can imagine the thin walls of a vein suffering the continuous hammering of two arteries at the average rate of 72 beats per minute throughout an entire lifetime. Ultimately, in the case of the left common iliac vein, this beating caused adhesion of its walls, leading to a reduction of the lumen and manifesting itself as unilateral varicose veins, edema, and thombosis. For example, the appearance of temporary edema is common at the beginning of pregnancy in the left inferior member or, when bilateral, is more pronounced on the left side. This is caused by an enlarged uterus that increases the arterial compression against the vein. The completed work was presented as my thesis for the doctor of science degree, and it was unanimously approved *summa cum laude*. The thesis received significant recognition 8 years later when Peck (1957) used my findings to explain the clinical signs of vascular insufficiency and subsequent slower growth of the affected inferior member. The venous obstruction and stasis caused growth insufficiency by slowing circulation and consequent oxygen deprivation to the tissues. Peck concluded that the association in many of dependent cyanosis or mottling, shortening of the bones of a member, and a decrease in circumference of the extremity, may represent a clinical syndrome, possibly related to an iliac venous obstruction, causing a partial block of the venous blood drainage.

My advisor, Professor Locchi, was searching in 1943 for references to the so-called "Bauhin's ileocecal valve" (at that time the luxury of a computerized library was not available) and pressed by administrative duties, presented the project to me for continued investigation. I accepted his gift with pride and fear: pride because he safeguarded his favorite project by placing it in my hands and fear because I might not live up to his expectations. The bibliography on the subject was enormous, and the study culminated in the presentation of my Ph.D. dissertation in anatomy (DiDio 1952), which was approved *summa cum laude*. The results of the investigation revolutionized the historical, anatomical, histological, physiological, radiological, clinical, and surgical aspects of the terminal ileum. I was even able to make a cinematographic film of the opening of the ileum into the large intestine in a living patient with a cecostomy—a project that had been unsuccessfully attempted by others. This work was selected by the organizing committee of the International Congress of Anatomy in Paris (1955) to be presented at the opening plenary session and is one of very few cases (40 in the world literature) of direct *in vivo* observation recorded, illustrated, and published. My eleventh case of *in vivo* observation of the terminal ileum was published in collaboration with Rosenberg (1969) and received the W. H. Rorer Award in Gastroenterology.

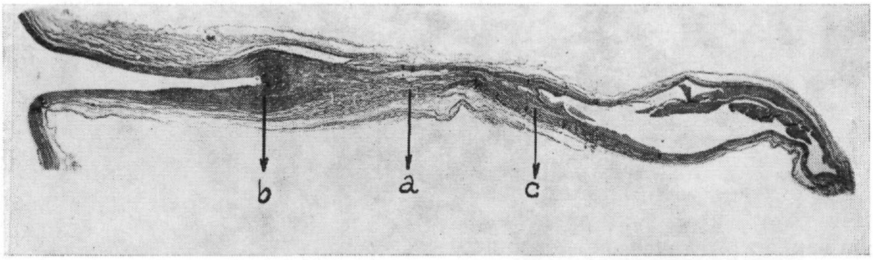


FIGURE 3. Cross section of the left common iliac vein at the level of an *adhesion* (male, adult, Caucasian). a=adhesion between the anterior and posterior venous walls; b and c=medial and lateral extremities of the adhesion, respectively. Weigert-Van Gieson staining. ×8.3 (from DiDio 1949).

Our bibliographical data, the investigations in cadavers and in the living individuals, furnished several interesting data, some of which put me in the position of an iconoclast. For example, from the anatomical, historical, and terminological standpoints, the "ileocecal valve of Bauhin" is not ileocecal, is not a valve, and is not Bauhin's! I was shocked to read Sappey's (1879) statements about Bauhin's plagiarism: "The ileocecal valve was discovered in 1573 by C. Varolius, who in pointing out its existence, also very clearly defined its functions. He gave it the name of operculum of the ileum. . . . By superimposing the two texts, their identity becomes evident. In order to conceal this somewhat, Bauhin took care to interpolate in his paragraphs an incidental phrase. . . . This author, then, is guilty of an act of scientific piracy which history, in its impartial and inflexible rigour, would hardly know how to stigmatize enough" (DiDio 1952, DiDio and Anderson 1968). I learned, for the first time, that even in science, in the search for truth, where honesty at any price is the basic ingredient, there may be corruption.

The next problem was to find a proper name for the "valve that was not." Based on the morphological, microscopic, functional, and radiological aspects, I proposed the name ileo-ceco-colic papilla, containing a biological device, the ileo-ceco-colic pylorus, to open and to close the orifice between the small and large intestine. Because the adjective form was too long, the present proposed names are ileal papilla for the structure and ileal pylorus for the muscular device (containing two components, a circular sphincter muscle and a longitudinal dilator muscle) similar to the gastroduodenal pylorus (fig. 4).

A remarkable fact was the major difference between the morphology of the terminal ileum in the cadaver and in the living individual. Post-mortem aspects of organs bear some resemblance to those normally seen *in vivo*, but the longer it takes after death to observe the structure the more it changes. Considering the difficulty in studying a fresh cadaver 4 centuries ago, early anatomists saw a morphological aspect of the structure that did not resemble the structure as it exists in the living. It was then the bilabial aspect that was taught as a paradigm and that served as a basis to justify a valvular mechanism, which had to be restored surgically when proven faulty. The surgical techniques that were devised to restore the valvular device were actually causing a change in the wrong direction: they were creating a poorer structure, to replace what was considered a faulty living one. The evidence obtained caused the surgical techniques to be abandoned because they resulted in irreversible damage to the terminal ileum.

I began to learn electron microscopy at the University of Washington in 1960, where I had the opportunity to work with the internationally renowned Dr. E. A. Boyden, on the termination of the bile duct in the horse. A surprise was in store for us! The corresponding structure of the sphincter of Oddi, which we expected to be comparable to the size of the animal, was in fact extremely small and its components very difficult to dissect. The explanation became obvious when we correlated the findings with the fact that the horse does not possess a gallbladder and that the flow of bile is continuous, thus not requiring a highly developed musculature at the level of the choledochoduodenal junction (DiDio and Boyden 1962).

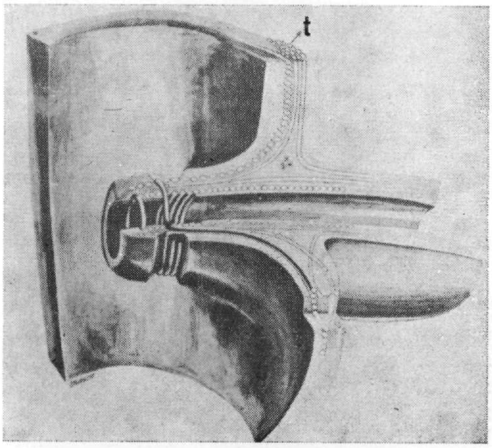


FIGURE 4. Diagram of the human *terminal ileum* and its *papilla* protruding into the large intestine. The circular muscle fibers form the *sphincter muscle* and the longitudinal muscle fibers form the *dilator muscle*, and both constitute the *ileal pylorus* (from DiDio 1952).

Later, the proper use of terminology for the correct concept originated a lucky result—another case of serendipity. I had been toying with the idea of removing the longitudinal component of intestinal musculature to cause a muscular imbalance and create an artificial or surgical sphincter by letting the circular musculature prevail. I presented the idea to Dr. M. C. Anderson, an associate professor of surgery at Northwestern University, and he reluctantly agreed to watch me attempt to perform the intervention in one of the dogs in his experimental surgery laboratory. As soon as the thin longitudinal musculature of the intestine was removed, we both shared the moment of witnessing the birth of an artificial sphincter, the confirmation of a prediction and the beginning of a new successful line of research. After the presentation of the first results at a congress of surgery, many compliments were received, including a left-handed one by an outstanding surgeon: "The technique is ingenious, simple, and excellent, but I wonder why it was not discovered earlier and why it was not a surgeon who had the idea first?" No comments then . . . and no comments now.

I published a monograph on the left renal vein (fig. 5), which is compressed between the superior mesenteric artery and the aorta by the tip of the pancreatic uncinate process and the duodenum (DiDio 1956). This arterial forceps repeats the same conditions encountered at the level of the terminal segment of the left common iliac vein. I was gratified that my interpretation of the changes occurring in the left common iliac vein, which had led me to the study of the left renal vein, was correct and that there

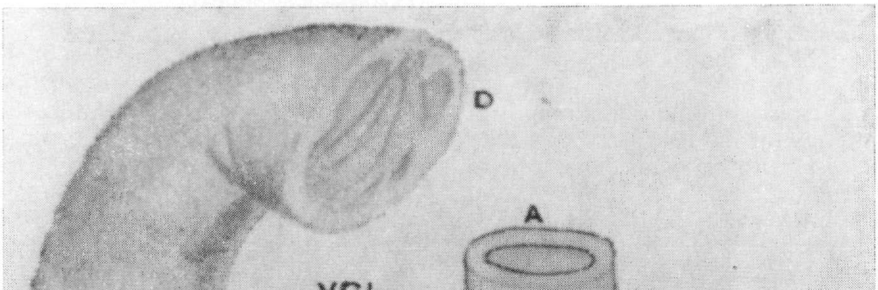


FIGURE 5. Diagram of the relationship of the *left renal vein* (VRE) with the duodenum (D) in the forceps made up by the superior meserteric artery (sectioned) and the aorta (A) in man. The left suprarenal vein (VSRE) is seen as a tributary of the left renal vein, which ends in the inferior vena cava (VCI) (from DiDio 1956).

was a consistent response in similar structures.

Impressed by the identification and surgical importance of the pulmonary segments and guided by the comprehensive view of the human body that I was attempting to gain, I asked myself whether other parenchymatous organs would follow the same segmental morphological pattern. I decided to concentrate on the segments of the kidney, and suggested to my graduate students that they undertake the same investigations on the spleen and liver. Nature did not disappoint me since in all these viscera the segmental arrangement, elusive at first, was found and proved valuable for surgical purposes.

It is well known to those involved in scientific research that there is a history for each project and for each paper. It is a personal, emotional history that is never published but that, once told, helps illuminate obscure issues, shows the origin of inspiration and the strength of motivation. In the case of the studies of renal segments, it will show how to lose the race against time. I had started to work intensively on the anatomicosurgical segments of the kidney. By 1953, there was no publication on the subject and I had 28 specimens to document the findings. Having been appointed chairman of the Department of Anatomy, the completion of the paper was slowed down. In England, a year later, Graves (1954) published an article on the anatomy of the intrarenal arteries and its application to segmental resection of the kidney, thus rightly becoming the discoverer of the renal segments. This occurrence shows how detrimental chairmanships are to research. He had just beat me to the finish line. It was my agony of defeat overwhelmingly compensated for by the ecstasy of victory since our results were identical. From the terminology he had used, I recognized that he had been inspired by the segments of ventilation of the lung, as I also had been. In fact, he went as far as to call the "apical segment" the "superior territory," as had been adopted for the lung (DiDio 1961).

I rewrote the monograph, included Graves' data, and presented it to the Brazilian Academy of Medicine in 1956. Much later, at the International Congress of Anatomy in Wiesbaden (1956), the terminology I had proposed was adopted in its entirety (Internat. Anat. Nomenclature Comm. 1968). This line of research proved fruitful and rewarding. In the spleen, my former students demonstrated the existence of venous segments (Neder 1958), of the arterial segments (Zappalá 1958), and successful application in humans (Campos-Christo 1960). In the liver, Nogueira (1958) provided the evidence of venous hepatic segments, and I presented a comprehensive view of the segmentations as the anatomical background for partial hepatectomy (DiDio 1978, 1980). With one of my former students, Professor H. Rodrigues, presently chairman of the Department of Anatomy at the Medical School in Vitoria (Brazil), I described the anatomicosurgical segments of the heart (DiDio and Rodrigues 1978, 1980).

With a fellowship from the Rockefeller Foundation in 1960, I first went to the University of Washington, a year later to Rockefeller University in New York, and then to Harvard Medical School to learn electron microscopy with leaders in the new field: Dr. H. Stanley Bennett, Dr. G. E. Palade (who was recently awarded the Nobel Prize) and Dr. Don W. Fawcett, respectively. They joined Professor Locchi in becoming the quadrumvirate to whom I owe my scientific career. Although excited and fascinated with the new and promising technique for the study of subcellular particles, I kept working at the macroscopic level. Noting the lack of clear systematization of the atrial arteries, I decided to study them in a unique series of hearts obtained from individuals who had committed suicide. As soon as I began to dissect the arteries, I was surprised to find recurrent vessels that did not follow the expected distribution and I considered them anatomical variations. In a few days, the variations became the most frequent pattern, which had been completely overlooked till then. I had discovered a set of vessels that probably had been seen by many anatomists who did not attribute any importance to them, perhaps because of their size (fig. 6). They are the atrioventricular and ventriculo-atrial arteries (DiDio 1967a), which establish a vascular suture between atria and ventricles. The abstract was selected from among all the gross anatomy papers and shared the honor of being presented with 5 others from each of the anatomical disciplines at the plenary session of the American Association of Anatomists Meeting in Denver (1964).

An electron microscopic study of the fast beating heart of the hummingbird (444/min at rest), among other interesting results, showed one of the largest mitochondria ever seen (DiDio 1967b) and brought to Toledo its first electron microscope for the investigation of biological structure.

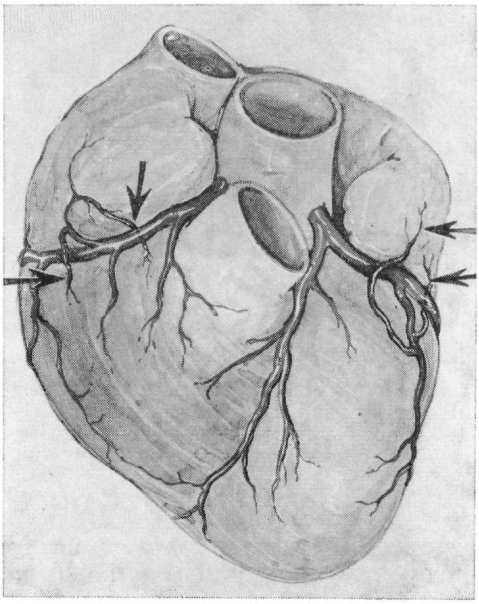

FIGURE 6. Diagram of the anterior view of an adult human heart to show the *atrioventricular* (right) and the *ventriculo-atrial* (left) *branches* of the major branches of the coronary arteries. The arrows point to recurrent vessels originating from an atrial artery (atrioventricular) and from a ventricular artery (ventriculo-atrial) (From DiDio 1967a).

Having investigated the myocardium of hummingbirds, I decided to study its differences as compared to the myocardium of the slow beating heart of the sloth (1968). Among the unexpected results, the heart of one of the controls, which happened to be a pregnant sloth as seen at necroscopy, had alterations only in mitochondria—the single pathological finding in an otherwise normal myocardium (fig. 7). I called the degeneration of the mitochondria a mitochondrosis or mitochondritis (DiDio 1971), an example of subcellular pathology. Faller (1977), working in Switzerland, recently confirmed this finding in the pancreas and termed it a mitochondriosis. At present, the study of the male offspring of that pregnant sloth is underway to see whether the mitochondriosis was also present in the myocardium and whether some light can be shed on this challenging subject.

I began to look at science from other perspectives, including the perspective of art. The study of medicine and its history led me to correlate them with art in an attempt to explore the biological laws to which painters and sculptors are subject. This intriguing relationship was presented under the title "Art, Anatomy, and Medicine" at the International College of Surgeons in Chicago, and was published soon after (DiDio 1971). The study was later extended to the more general relationship between art and science and, recently, to art, music, literature, religion, including, among other topics, anatomy in Dante's **Inferno,**—proving that science can lead one to places other than paradise.

These scientific activities have brought many honors and benefits; the most recent included presiding over the Pan American Congress of Anatomy in New Orleans (1972), during which I became an honorary citizen of the City of New Orleans, election as Honorary President of the Pan American Association of Anatomy, heading the United States' delegation to the 3rd International Symposium on the Morphological Sciences in TelAviv (1977), having been President of the IV International Symposium on the Morphological Sciences in Toledo (1979), and receiving the Anatomist of the Year Award (1979), having been President of the Ohio Academy of Science and having presided over this exciting annual meeting.

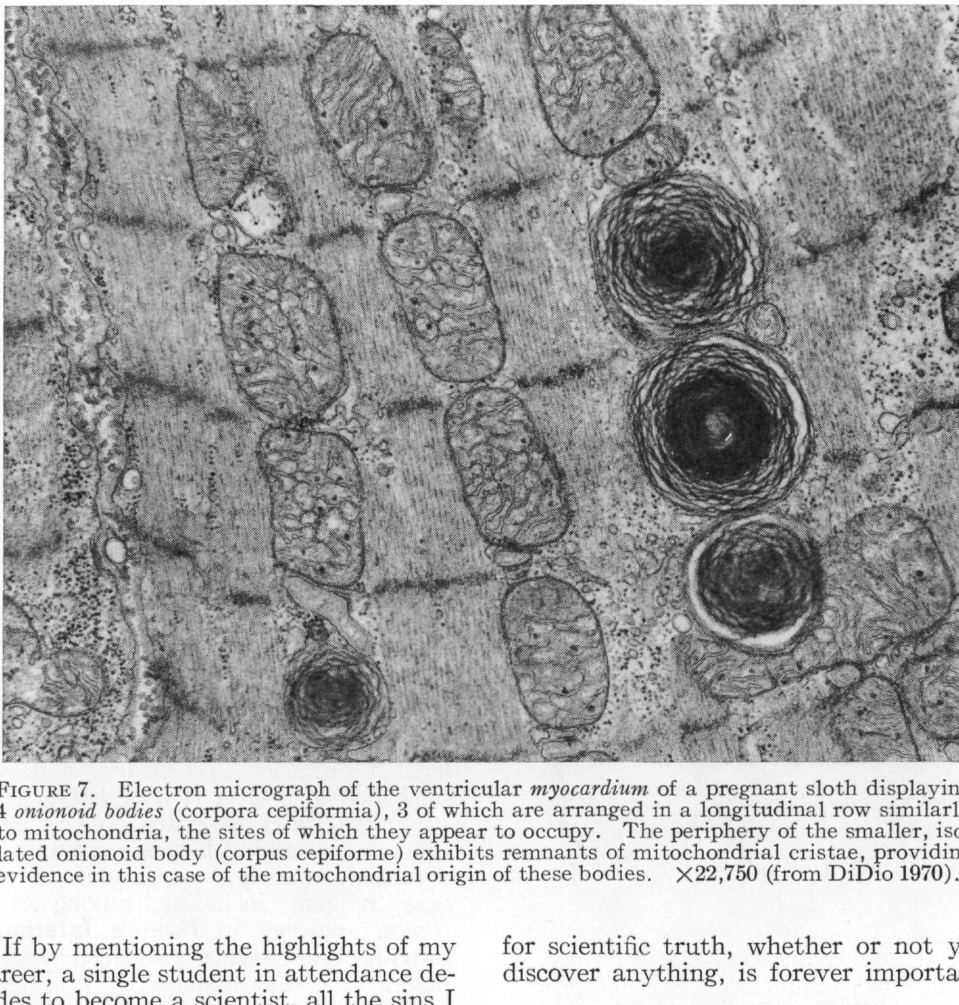

FIGURE 7. Electron micrograph of the ventricular *myocardium* of a pregnant sloth displaying 4 *onionoid bodies* (corpora cepiformia), 3 of which are arranged in a longitudinal row similarly to mitochondria, the sites of which they appear to occupy. The periphery of the smaller, isolated onionoid body (corpus cepiforme) exhibits remnants of mitochondrial cristae, providing evidence in this case of the mitochondrial origin of these bodies. ×22,750 (from DiDio 1970).

If by mentioning the highlights of my career, a single student in attendance decides to become a scientist, all the sins I have committed this evening, especially pride, not to mention gluttony, were worth committing. I learned that no one should be reluctant to say he is right, as I did this evening, disregarding true or false modesty. The reward for work well done is more work. Judging by the amount of work facing me, I cannot complain. In sharing with you some behind-the-scences happenings, I was able to say when I was wrong. If you find an old scientist who is afraid to say that he is wrong, then he still needs to grow up.

In closing, it is a pleasure to state that, with the wondrous help of serendipity, it was worth spending almost half a century studying medical sciences. The search for scientific truth, whether or not you discover anything, is forever important.

## LITERATURE CITED

Campos-Christo, M. C. 1960 Splénectomies partielles réglées: à propos de 3 cas opérés. Presse Med. 68: 485–486.

DiDio, L. J. A. 1942 Observations on Whitnall's "orbital tubercle" on the malar bone in man. Anais Fac. Med. Univ. São Paulo 18: 43–64.

——— 1943 Manganese in Brazilian foods. Hospital 24: 381–388.

——— 1944 Manganese content in foods. Rev. Medicina 28: 315–336.

——— 1949 Normal and pathological structures on the inner surface of the left common iliac vein. Arq. Cir. Clin. Experim. 12: 507–616.

——— 1952 Ileo-ceco-colic pylorus and papilla. Rev. Hosp. N. S. Aparec., São Paulo 5: 191–442.

——— 1956 Applied anatomy of the renal veins. The importance of the aortico-mesenteric forceps. The renal segments. Anais Fac. Med. Univ. Minas Gerais 16: 51–202.

——— 1961 Anatomicosurgical vascular segments of the human kidney. Anat. Rec. 139: 299.

——— 1962 The presence of the eminentia orbitalis in the os zygomaticum of Hindu Skulls. Anat. Rec. 142: 31–40.

——— 1967a The atrioventricular branches of the human coronary arteries. J. Morphol. 123: 397–404.

——— 1976b Myocardial ultrastructure and electrocardiograms of the hummingbird under normal and experimental conditions. Anat. Rec. 159: 335–352.

——— 1968 Myocardial ultrastructure and electrocardiograms of the sloth under normal and experimental conditions. J. Morphol. 124: 1–21.

——— 1970 Electron microscopic study of onionoid bodies (corpora cepiformia) in the myocardium of *Bradypus tridactylus*. J. Submicr. Cytol. 2: 147–155.

——— 1971 Myocardial mitochondrosis or mitochondritis: an electron microscopic study. Ateneo Parmense Acta Biomed. 42: 359–399.

——— 1971 Art, Anatomy and Medicine. Internat. Surg. 56: 311–324; 381–391.

——— 1978 The anatomical background for partial hepatectomy. Proceed., 5th Pan American Congress of Anatomy, São Paulo, Brazil 198–204.

——— 1980 Segments of the liver: the anatomical basis for partial hepatectomy. *In:* Motta, P. and DiDio, L. J. A. (eds.) Modern Hepatology. M. Nijhoff Publ. Den Hague.

——— and M. C. Anderson 1968 The "Sphincters" of the Digestive System. William and Wilkins Co., Baltimore.

——— and E. A. Boyden 1962 The choledochochoduodenal junction in the horse—a study of the musculature around the ends of the bile and pancreatic ducts in a species without a gall bladder. Anat. Rec. 143: 61–70.

——— and H. Rodrigues 1978 and 1980 Arterial segments in the ventricles of the human heart. Proceed., 5th Pan American Congress of Anatomy, São Paulo, Brazil and 11th International Congress of Anatomy, Mexico City.

Faller, A. 1977 Gibt es eine Mitochondriose? Acta Anat. 99: 263–264.

Graves, F. T. 1954 The anatomy of the intrarenal arteries and its applications to segmental resection of the kidney. Brit. J. Surg. 42: 132–139.

International Anatomical Nomenclature Committee 1968 Nomina Anatomica (3rd ed.). Excerpta Medica Found., Amsterdam.

McMurrich, J. P. 1906 The valves of the iliac vein. Brit. Med. J. 2: 1699–1700.

——— 1907 Congenital adhesions in the Common iliac veins. Anat. Rec. 1: 78–79.

——— 1908 The occurrence of congenital adhesions in the common iliac veins, and their relation to thrombosis of the femoral and iliac veins. Amer. J. Med. Sci. 135: 342–346.

Neder, A. M. 1958 Anatomical study of the splenic venous segments and on their drainage in man. Anais Fac. Med. Univ. Minas Gerais 18: 265–310.

Nogueira, C. E. D. 1958 Anatomical bases for segmental hepatectomy. Rev. Assoc. Med. Minas Gerais 9: 191–193.

Oddi, R. 1887 Di una speciale disposizione a sfintere allo sbocco del coledoco. Tipogr. V. Santini, Perugia. 18 pp.

Okamoto, J. 1922 Note on the adhesion in the vena iliaca communis sinistra. Folia Anat. Japon. 1: 105–108.

Orent, E. R. and E. V. McCollum 1931 Effect of deprivation of Mn in rat. J. Biol. Chem. 92: 651–678.

Peck, M. E. 1957 Obstructive anomalies of the iliac vein associated with growth shortening in the ipsilateral extremity. Ann. Surg. 146: 619–629.

Rosenberg, J. C. and L. J. A. DiDio 1969 In vivo appearance and function of the termination of the ileum as observed directly through a cecostomy. Amer. J. Gastroenter. 52: 411–419.

Sappey, P. C. 1879 Traité d'Anatomie Descriptive (3rd ed.). V. A. Delahaye et Cie, Paris.

Terry, R. J. and M. Trotter 1953 Osteology, *In:* J. P. Schaeffer Morris' Human Anaomy (11th ed.). Blakiston Co. Philadelphia.

Whitnall, S. E. 1911 On a tubercle on the malar bone, and on the lateral attachments of the tarsal plates. J. Anat. Physiol. 45: 426–432.

Zappalá, A. 1958 Arterial segments of the spleen. Unpubl. Ph.D. Thesis. in Anatomy, Univ. Minas Gerais, Belo Horizonte, Brazil.